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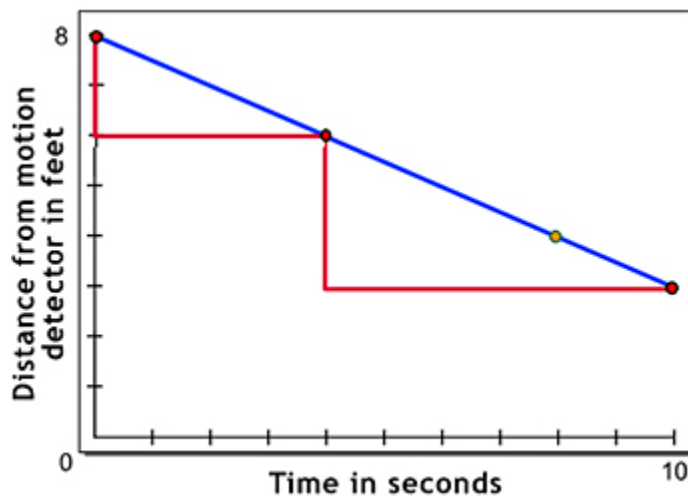
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Algebra 1-Vocabulary

Test-Study Guide

Constant Rate of change -A constant rate of change occurs when the rate at which one quantity changes with respect to another quantity stays the same over every interval. Relationships that have a constant rate of change show a pattern of repeated addition.

Graphs of situations with a constant rate of change are linear. For example, the relationship between the time a skateboarder skates and the distance from a motion detector is shown in the graph and table. This relationship has a constant rate of change of $-1/2$ ft/sec.



Time(sec)	Distance(ft)
0	8
4	6
8	4
10	3

Annotations: Red zigzag arrows on the left indicate time intervals of 4, 4, and 2 seconds. Red zigzag arrows on the right indicate distance intervals of -2, -2, and -1 feet.

Ratio-A ratio is an association of two or more quantities.

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This example shows 3 red chips for every 2 blue chips. The ratio of red chips to blue chips is 3 to 2. This ratio can also be written as 3:2.

In some situations, ratios may be written as quotients, such as $(3/2)$

Rate of change-The rate of change of a function is a comparison of the change in the dependent variable to the change in the independent variable.

The table shows data for a swimming pool that is being drained. The rate of change is -150 gallons per hour.

Marino Pool Drainage

Elapsed time draining in hours		Volume of water in pool in gallons	
2 hrs. 2 hrs. 2 hrs. 2 hrs.	0	1200	-300 gal. -300 gal. -300 gal. -300 gal.
	2	900	
	4	600	
	6	300	
	8	0	

$$\frac{-300 \text{ gal.}}{2 \text{ hrs.}} = -150 \text{ gal./hr}$$

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Average rate of change-

The average rate of change of a function over an interval is the quotient of the change in y-values and the change in x-values over the specified interval.

For example, the average rate of change of the function represented by the graph over the interval $3 \leq x \leq 7$ is

$$\frac{3 \text{ feet} - 3 \text{ feet}}{7 \text{ feet} - 3 \text{ seconds}} = \frac{0 \text{ feet}}{4 \text{ seconds}} = 0 \text{ feet per second.}$$

The average rate of change of the function represented by the graph over the interval $5 \leq x \leq 9$ is

$$\frac{6 \text{ feet} - 2 \text{ feet}}{9 \text{ feet} - 5 \text{ seconds}} = \frac{4 \text{ feet}}{4 \text{ seconds}} = 1 \text{ foot per second}$$

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Proportional relationship-A proportional relationship is a relationship between two changing quantities in which the ratios between the two quantities are equivalent.

The table shows the relationship between the time and distance a car travels. The ratios of time to distance are equivalent. So, the relationship between distance traveled and time driven is proportional.

Constant of proportionality-The constant of proportionality is the quotient of two quantities in a proportional relationship.

If x and y are related by a proportional relationship, then $y = kx$, where k is the constant of proportionality.

This can also be written as $y = kc$.

The graph shows a proportional relationship between defective jeans and total jeans produced in a factory. The quotient $\frac{1}{28}$ is the constant of proportionality in this situation.

Inverse Variation-

In inverse variation, the product of the value of the independent variable and the value of the dependent variable is constant. This is written as $xy = k$, or $y = \frac{k}{x}$.

Direct variation-

In a direct variation, the ratio of the value of the dependent variable to the value of the independent variable is constant. This is written as $\frac{y}{x} = k$, or $y = kx$.

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Constant of variation-

The constant of variation is the nonzero ratio between two variables in a direct variation or the nonzero product of two variables in an inverse variation.

In each of the rules shown, k is the constant of variation.

Direct variation: $k = \frac{y}{x}$, or $y = kx$

Inverse variation: $k = xy$, or $y = \frac{k}{x}$

Linear function-A linear function is a relationship between two variables whose graph in the coordinate plane is a straight line.

Quadratic function-

A quadratic function is a function of the form $f(x) = ax^2 + bx + c$, where a , b , and c are real numbers. For example, $f(x) = x^2$, $g(x) = -2x^2 - 3$, and $h(x) = 5x^2 - 3x + 1$ are all quadratic functions.

direct variation-

In a direct variation, the ratio of the value of the dependent variable to the value of the independent variable is constant.

This is written as $\frac{y}{x} = k$, or $y = kx$.